User Interactions and Multisensory Responses to the Oral Health Literacy Curriculum

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FACT 1: Our academic website, the Digital Literacy Partnership at Miami University, promotes materials for literacy, health, and technology on learning.


http://dlp.lib.miamioh.edu

Healthy People 2020 lists 2 objectives relating directly to our goals in "Health Communication and Health Information Technology":
1. HC/HIT-8: Increase the proportion of quality, health-related websites.
2. HC/HIT-13: Increase social marketing in health promotion and disease prevention.

The Digital Literacy Partnership is a website compiled of 3 health-related databases, including children's picture books, public service announcements, and health literacy materials @ https://dlp.lib.miamioh.edu/

In the Health Literacy Database at Miami University (2nd database above), a new genre of literature is available for people with low and emergent literacy. Our study focuses on an eBook for Oral Health Literacy©.
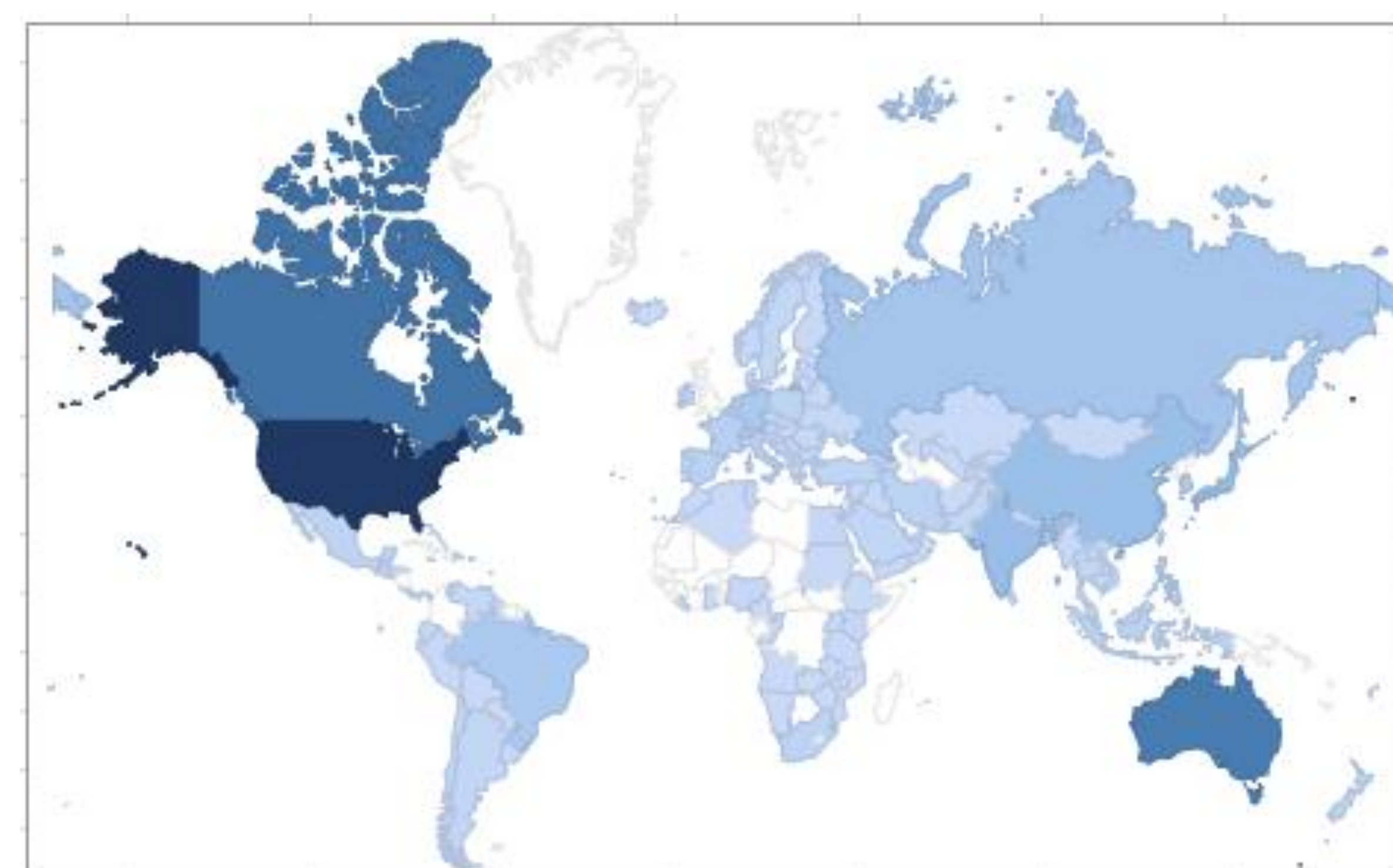
Current DLP Data: By the Numbers
•Between February 2014 and April 2018, our data show that the DLP has had more than 83,000 pageviews from 154 countries (figure above).
•The top 8 countries with the greatest access hits are United States, Australia, Canada, United Kingdom, India, Japan, South Korea, & China.

FACT 2: The eBook for Oral Health Literacy is a digital curriculum that promotes a new genre of literature for people with low and emergent literacy.

Our eBook for Oral Health Literacy© is a free, online curriculum of picture stories showing children demonstrating positive oral health habits with family, friends, and health professionals.

eBook chapter themes include: oral hygiene, nutrition, healthy beverage consumption, dental visits, and medication safety.

Realistic child-centered photographs are supported by written and spoken scripts to promote self efficacy and prosocial norms about brushing, flossing, and going to the dentist.

Our digital curriculum aims to boost reading and talking about oral health in one-minute intervals while enhancing child-patient interactions in school-based health clinics and/or community dental clinics.

Health Literacy
•Health literacy is the number one predictor of health status (WHO Europe, 2013) and a social determinant of health (U.S.CDC, 2017).
•People with limited health literacy are at risk of having less health knowledge, lower health status, higher use of health services, and higher health care costs.
•Similar to our own project, the U.S. *Healthy People 2020* document is focused on reading skills:
AH-5.3.1 Increase the proportion of 4th grade students whose reading skills are at or above the proficient achievement level for their grade.
A similar objective is stated for grade 8 and grade 12.

I **decide** to keep my teeth healthy by drinking milk every morning with my brother.

An Electronic Text for Health Literacy© promotes functional health literacy which is one's ability to read, write, and speak about health (Ubbes, 2014).

FACT 3: Eye Tracking methodology provides a useful way to conduct process evaluation when pretesting a multisensory oral health literacy curriculum.

Eye Tracking Methodology

Eye tracking technology allows usability researchers to go beyond self-reported attitudinal data to better understand how users visually process interface content. Specifically, eye tracking can help researchers determine what users are looking at, for how long, and the visual paths taken. An important underlying assumption made in eye tracking research is the mind-eye hypothesis, which suggests that people will cognitively process what they visually attend to (Just and Carpenter 1984).

Previous eye tracking research has looked at the effectiveness of different processing strategies when text and pictures are presented together as stimuli. In these contexts, much learning occurs via textual processing (Hannus and Hyona 1999; Schmidt-Weigand et al. 2010), and people tend to attend more to the text than pictures (Rayner et al. 2001). However, integration of information gathered from text and pictures tends to lead to the best learning outcomes (Koc-Januchta et al. 2017).

Research Goal:
Our primary goal was to evaluate the usability of a curriculum prototype for improving oral health literacy. We conducted usability testing on preK-12 teachers and professional parents by collecting eye tracking data from participants after they experienced the digital curriculum under testing conditions. A collection of E-Texts comprises 12 chapters in an online eBook for Oral Health Literacy. Our two-phase pilot study describes user interactions and experiences on one E-Text chapter prototype entitled "Decisions to Keep My Teeth Health and Strong" located as an open source document at https://dlp.lib.miamioh.edu/etext/.

Results:
We found significant differences in how the two groups, parents and teachers, visually processed slide content.
When the text and picture both appeared on the slides, teachers spent 63% of their time looking at the text and 13% of their time looking at the picture.
In comparison, parents spent 57% of their time looking at the text and 21% of their time looking at the picture.
After the audio icon was clicked for narration, teachers spent 62% of their time looking at the text and 15% of their time looking at the picture, while parents spent 55% of their time looking at the text and 26% of their time looking at the picture.
Teachers read the text word for word during narration without looking at the picture much or at all. Parents, on the other hand, would spend time looking at the picture more during the narration.

Conclusion:
Process evaluation is a necessary step in a health literacy curriculum design to determine audience preferences in multisensory processing.

Future Plans:
We plan to incorporate feedback from dental professionals and from elementary children (our target audiences) now that we have piloted the eye tracking procedures.